UOP Callidus Oxidizers for Waste Destruction

TODAY’S THERMAL OXIDIZER SOLUTIONS
TO MEET TOMORROW’S CHALLENGES

Thermal oxidizer systems

Catalytic oxidizer systems
Callidus, experts in Thermal Oxidizers

Wide Range of Applications
UOP Callidus by Honeywell is an industry leader in environmental and combustion technology. We have provided incinerators for a wide variety of gas and liquid wastes including inorganic particulate, various acids and hard-to-burn organic compounds. Our experience extends to development and implementation of Thermal Oxidizer systems for Flame, Tall Gas, Halogenated Waste, Bound Nitrogen, Catalytic Oxidizers and Downflow Incinerators including units with ratings of over 400 MM BTU/hr.

All UOP Callidus products - Burners, Flares, Selective Catalytic Reduction systems and Thermal Oxidizers - are engineered and designed by combustion experts who have years of experience and are focused on customer satisfaction and emission compliance.

Dedication to our customers is proven by the performance of our thermal oxidizer group. The engineers in this group are the performance of our thermal oxidizers worldwide.

We Pride Ourselves On Quality
Our manufacturing facility employs the highest standards in the industry. Like many companies, our manufacturing techniques use state-of-the-art equipment; but, what truly sets UOP Callidus apart is our people. We take great care to ensure that highly trained individuals are used in performing our special requirements. Ongoing and regularly scheduled training through our research and development group assures that a high level of quality is maintained.

UOP Callidus quality assurance personnel thoroughly inspect each assembly prior to shipment, thus reducing installation time. UOP Callidus fabrication and manufacturings certified ISO 9001:2008 in the USA and China.

UOP Callidus Leads The Way With Engineering Excellence
UOP Callidus focuses on meeting each customer’s individual requirements, resulting in a custom-designed solution for every project. In fact, on average, each engineer has 15 years experience designing thermal oxidizers.

Advanced Manufacturing and Fabrication Capabilities
Upgrading our manufacturing and fabrication facilities is an ongoing process at UOP Callidus. Our fabrication facilities employ the latest manufacturing practices and equipment.

As a global leader in the thermal oxidizer market, much of our fabrication occurs in strategic locations around the world while proprietary items are fabricated in our own facilities. This approach makes good economic sense, and provides our customers the best value for their combustion system.

Fume Thermal Oxidizer
UOP Callidus Fume Thermal Oxidizers thermally treat organic fumes in air or inert gas streams at temperatures between 1400ºF and 1600ºF. Destruction efficiencies typically range from 99 to 99.99 percent.

Fume Thermal Oxidizer
Typical Equipment
- Low emissions burner
- Ceramic fiber refractory
- Forced draft operation
- Heat recovery equipment
- Burner management system
- Stack

Typical Waste Streams
- VOC streams
- Process vents
- Pharmaceutical vents
- Dryer exhausts

Typical Installation
- 5 to 100 MM BTU/hr burner
- 1 second residence time
- 1500ºF operating temperature

Typical Installation
- 20 to 150 MM BTU/hr burner
- 1 second residence time
- 1200ºF-1500ºF operating temperature

20 MM BTU/hr sulfur plant tail gas incinerator
15 MM BTU/hr fume incinerator
9.5 MM BTU/hr fume incinerator
22 MM BTU/hr tail gas unit
8 MM BTU/hr brominated waste
Closed loop gasification system for wood products plant
Soil remediation
Typical Installation
- Refineries
- Natural Gas Processing Plants
- 20 to 150 MM BTU/hr burner
- 1 second residence time
- 1200ºF-1500ºF operating temperature

Tail Gas Thermal Oxidizer
Tail Gas Thermal Oxidizer
Typical Equipment
- Low emissions burner
- Castable or brick refractory
- Natural draft/forced draft
- Heat recovery (optional)
- Stack

Typical Waste Streams
- Sulfur plant tail gas
- Carbon black tail gas

Typical Installation
- Refineries
- Natural Gas Processing Plants
- 20 to 150 MM BTU/hr burner
- 1 second residence time
- 1200ºF-1500ºF operating temperature

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**Downfired Thermal Oxidizer Systems**

Thermal destruction of aqueous or organic waste streams containing inorganic or organic alkali metal salts requires that the thermal oxidizer be downfired to prevent accumulation of molten salts in the oxidizer furnace. Because molten salts tend to destroy refractory, the UOP Callidus design minimizes salt contact with refractory lining which improves refractory life.

Particulates entrained in the flue gas are removed by either a wet or dry flue gas cleanup system depending on the required emissions rate. In the UOP Callidus wet system, salt or ash-laden flue gas from the oxidizer first enters the quench system located directly below the thermal oxidizer. Here the hot gas is quenched to its adiabatic saturation temperature by water injection or by a UOP Callidus high efficiency submerged quench system (patent pending).

Then, the saturated flue gas flows through a wet venturi scrubber and/or WESP (Wet Electrostatic Precipitator) before being sent to a packed column scrubber, if required, or vented to the atmosphere through a stack. In the UOP Callidus dry system design, flue gas from the oxidizer is typically cooled by air and/or water injection before being sent to a baghouse or an electrostatic precipitator for particulate removal.

Destruction efficiencies greater than 99.99 percent are routinely achieved for most organic waste components at temperatures of approximately 1800ºF. Particle matter emission rates may vary from as low as 0.005 to 0.08 grains/DSCF, depending on the particle removal equipment selected to meet the customer’s requirements.

**Typical Equipment**
- Low emission burner
- Low porosity brick refractory
- Forced draft
- Adiabatic quench
- Particulate removal

**Typical Waste Stream**
- Ethylene plant blowdown
- Caustic waste streams

**Typical Installation**
- Chemical plant
- 20 to 80 MM BTU/hr burner
- 2.0 seconds residence time
- 1650ºF-1800ºF operating temperature

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**Halogenated Waste Thermal Oxidizer Systems**

UOP Callidus has extensive experience in halogenated organic waste oxidation. The most common halogen is chlorine. Thermal oxidation of chlorinated hydrocarbons produces hydrogen chloride gas (HCl) and some free chlorine, which must be removed. The quantity of HCl in the flue gas determines whether a single or two-stage HCl removal system is used. Either an HCl absorber or a caustic scrubber is used when a small quantity of HCl is present. A two-stage system is often used to reduce caustic usage when the flue gas contains a significantly large quantity of HCl.

UOP Callidus Halogenated Waste Thermal Oxidizer Systems are capable of destruction efficiencies up to 99.99 percent. Operating temperatures can range from 1500ºF to 2200ºF with residence times of 1.0 to 2.0 seconds depending on the destruction efficiency required.

**Typical Equipment**
- Medium intensity burner
- Forced draft
- High alumina brick refractory
- Heat recovery equipment
- HCl recovery/scrubber

**Typical Waste Stream**
- PVC plant vents
- VCM waste liquids
- Pharmaceutical vents
- Bromine liquid wastes

**Typical Installation**
- Chemical plant
- 10 to 50 MM BTU/hr burner
- 2.0 seconds residence time
- 1800ºF operating temperature
UOP Callidus offers the best in design, quality, performance and delivery.

Low NOx deNOxidizer Systems
Thermal oxidation of nitrogen-bearing wastes require a specialized combustion approach. Single-stage combustion of these wastes can produce NOx emissions in excess of those allowed by most regulatory agencies. To maintain NOx emissions within acceptable limits, UOP Callidus uses a three-stage combustion process to destroy these wastes.

The waste is burned in the first stage under substoichiometric, or reducing conditions. The high temperatures and lack of oxygen in the first stage cause the nitrogen-bearing compounds to form elemental nitrogen rather than NOx.

In the second stage, flue gas from the first stage is cooled to approximately 1400°F by injection of water, steam, or cooled recycled flue gas.

The combustion process is completed in stage three where the flue gas is oxidized at a temperature of 1700°F to 2000°F with excess oxygen present. NOx in the final flue gas typically ranges from 80 to 200 ppm, depending on the waste composition. A destruction efficiency of 99.99 percent can be achieved for most compounds.

Low NOx Thermal Oxidizer
Typical Equipment
- High intensity burner
- Brick lined furnace
- Forced draft
- Heat recovery equipment
- 3-stage process

Typical Waste Streams
- Ammonia vents
- Acrylonitrile vents
- Nitrogen bound organic wastes

Representative Installation
- Petrochemical plant in India
- 10 to 60 MM BTU/hr
- 2.0 seconds residence time
- 2200°F/1600°F operating temperatures

At UOP Callidus We Exceed the Expected
At UOP Callidus, quality assurance and customer satisfaction are our top priorities. Each step of a project is reviewed to meet or exceed our customers’ requirements and standards. Where applicable, equipment is pre-assembled and tested. Fabrication is accomplished either in-house or by certified, experienced suppliers. Our rigorous quality inspection program is evidenced by our ISO 9001:2008 certification.

Unequaled Research and Development
Our industrial scale Thermal Oxidizer R&D Facility is fully instrumented and utilizes process control and data logging systems. The facility is devoted to research and development of new products, new combustion processes, improvement of existing equipment processes, and problem-solving efforts. The center also serves as a research facility for regulatory agencies as well as private clients.

The Thermal Oxidizer R&D Facility currently consists of two major combustion systems: a vertical, downfired salt type unit with complete wet quench system, and a three-stage, low NOx horizontal UOP Callidus deNOxidizer system. Both units are designed to be easily reconfigured to allow numerous process configurations. The computer control system and its leading edge data acquisition system also enhance the capabilities of the test facility.

A separate pad, complete with stack, utility hook-ups, and flue gas sampling equipment, is also available for equipment checkout and specialty combustion testing for our customers.

Our R&D facility investment and capabilities, along with our dedication to quality and continually improved incinerator school, underscores UOP Callidus’ commitment to being the leader in the worldwide environmental and combustion industry. We don’t just follow the standards - we set them.
Test Facility
The UOP Callidus test facility is in continual use for combustion technology research and development as well as customer witnessed demonstrations. Our array of test systems allows us to closely match actual field operating conditions, providing results which will more accurately predict actual measured performance.

Global Coverage
UOP Callidus reaches the global market through our headquarters located in Tulsa, Oklahoma, USA with regional direct sales offices and independent sales representation around the world. Meeting our customers’ expectations and setting the standards for the combustion industry have always been our company goals. Each burner, flare, thermal oxidizer and catalyst system we design and manufacture is built with those goals in mind.

Direct Sales Offices:
UOP Callidus Corporate
Headquarters, USA
7130 South Lewis Ave. Suite 335
Tulsa, Oklahoma 74136
Phone: +1 918 496 7599
www.callidus.com
UOP Callidus China
Phone: +86 21 2894 3082
UOP Callidus India
Phone: +91 22 6765 0652
Phone: +1 918 640 8837
UOP Callidus Europe
Phone: +44 7805 905671
UOP Callidus Korea
Phone: +82 2 799 6090
UOP Callidus Houston
Phone: +1 281 433 1501
UOP Callidus U.A.E.
Phone: +971 2 409 0582
Phone: +1 918 640 8837